Aalto University
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Setting an Example. The Effect of Board Quotas on Female Labor Market Outcomes in Finnish State-owned Companies

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Abstract

In early 2005, the Finnish parliament reformed the law on equality between women and men. The reform added a section which introduced a quota, forcing Finnish state-owned companies to have equal representation of women and men on their boards. Finnish state-owned companies had varying levels of female board members before the reform and were therefore unequally affected by the quota. Companies that already had equal representation had to take no measures, while companies with zero female board members had to take comparatively large measures to comply with the new ruling. I utilize this difference as an instrument in researching how female representation on company boards affects both the overall female employee share, and women's earnings.

Finnish state-owned companies are divided into three categories by ownership: companies owned by the central government, companies owned by the municipalities, and companies owned by the Åland government. The companies are heterogenous in most matters, varying in purpose, size and other aspects; however, they are all similarly affected by the quota. In addition to my main regressions, where I include all state-owned companies, I run regressions where I limit the sample to include only government-owned companies to research whether there is a difference in outcome that might depend on ownership. Regardless of controls or instruments, I find no such difference.

Ultimately, my research design fails, as Finnish state-owned companies fail to comply with the law in every year on average. Without near full compliance, my instrumental variables regressions provide unsatisfying results which cannot be interpreted as causal. However, I do provide evidence of a positive correlation between the share of women on company boards and female representation in the top earning echelons. Furthermore, I discuss different explanations to why Finnish state-owned companies fail to comply with the law and argue that the most persuasive reason is the absence of sanctions for non-compliance.

Keywords Discrimination, Gender wage gap, Board quota, State-owned companies

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Abstrakt

Våren 2005 röstade den finska riksdagen igenom en reform av lagen om jämställdhet mellan kvinnor och män. Reformen introducerade en könskvot, som tvingade finländska offentligt ägda bolag att ha en jämn könsfördelning i styrelsen. Eftersom finländska offentligt ägda bolag hade varierande könsfördelning innan könskvotens införande, så påverkade kvoten företagen olika mycket. Företag som redan hade en jämn könsfördelning behövde inte ta några åtgärder, medan företag som hade noll kvinnor i styrelsen behövde ta jämförelsevis stora åtgärder för att nå en jämn könsfördelning. Jag använder denna skillnad som ett instrument för att undersöka könskvotens inverkan på andelen kvinnor anställda i företaget, och kvinnors löner.

Finländska offentligt ägda bolag delas in i tre kategorier enligt ägarstruktur: bolag kontrollerade av staten, kommunalt ägda bolag, och bolag ägda av Ålands landskapsregering. Bolagen är heterogena i flera aspekter, då de till exempel skiljer sig i syfte och storlek. Gemensamt är att alla bolag påverkas likvärdigt av könskvoten. Utöver mina huvudsakliga regressioner där jag inkluderar alla offentligt ägda bolag, så väljer jag att köra regressioner där jag begränsar mitt sampel till bolag kontrollerade av staten för att undersöka om det finns skillnader som kan bero på ägarstruktur. Jag finner dock ingen sådan skillnad, oavsett kontroller eller instrument.

Jag kommer fram till att finländska offentligt ägda bolag i genomsnitt misslyckas med att nå upp till könskvotens krav under alla samplets år, vilket leder till att forskningsmetodiken i denna avhandling misslyckas. Då bolagen inte ökar antalet kvinnor i styrelserna enligt kvoten, så kan resultaten från mina instrumentvariabelregressioner inte tolkas som kausala. Jag finner dock en positiv korrelation mellan en högre andel kvinnor i styrelser och kvinnlig representation bland de bäst avlönade medarbetarna i företagen. Slutligen diskuterar jag även varför finländska offentligt ägda bolag inte följer lagen, och kommer fram till att den mest sannolika orsaken är avsaknaden av straff för bolag som inte når upp till könskraven.

Nyckelord Diskriminering, löneskillnader, kvotering, offentligt ägda bolag

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1. Introduction

In year 2005, Finland introduced § 4a in the law on equality between women and men (Lag om jämställdhet mellan kvinnor och män 609/1986). It states that state-owned companies are to have an equal representation of women and men on company boards, if there are no special reasons for it to be otherwise. The section thus introduced a quota, demanding state-owned company boards to have both genders represented.

My empirical strategy is to conduct an instrumental variables estimation where I use the pre-quota gender ratio as an exogenous instrument for female representation. My purpose is to find out how the gender composition on boards affects the female employee share and the representation of women in the top earning echelons.

Female representation and equal opportunities have been prevalent topics in policy debate on equality for a long time. Issues such as: the gender pay gap, parental leave, equal opportunity and fair outcomes, are high up on the societal agenda in the Nordics. Public policy debate is often filled with discussion based on figures that are easily countered with arguments on selection bias, as labor market outcomes are largely determined by endogenous decisions. This thesis adds data-based evidence to the debate.

Quotas mandating representation of both genders on company boards have been introduced in several countries, including Norway, Belgium, France, Germany, Iceland, India, Israel, Italy, and Spain (Bertrand et.al. 2018). The specifics of the quotas differ from country to country, but the general idea behind the quotas is to increase female representation. The Finnish quota differs from its peers, as it only concerns state-owned companies while the quotas in the countries listed above concern public limited companies.

My methodology and research design replicates Bertrand, Black, Jensen & Lleras-Muney's *Breaking the Glass Ceiling? The effect of board quotas on female labour outcomes in Norway* (2018) in a Finnish context. Bertrand et. al. research a vast set of labor market outcomes, from which I have chosen to replicate five. Bertrand et. al.'s paper found weak and mostly insignificant effects from introducing a gender quota on the outcome variables that I am interested in. The authors therefore conclude that the quota had no meaningful effect on female labor market outcomes in the short to medium term.

2. Theory

2.1 Background

Women are, and have always been, underrepresented on company boards in Finland in proportion to their share of the workforce. According to the Finnish chamber of commerce (2019), 29 percent of board members in Finnish publicly listed companies were women in 2019, rising from 18 percent in 2011. The disparity between men and women can exist for several reasons. One possibility is that women are discriminated against. A second possibility is that women and men make different endogenous decisions that lead to different career paths. A third possibility is that board appointments are made through networks, which might not extend to women as much as they do to men. Possibly all three, and other, explanations are true.

Using a Blinder-Oaxaca method, Maczulskij & Nyblom (2020) found that there was a 13% discriminatory wage gap in Finland. They used a sample consisting of nearly half a million Finnish wage-earners; hence, the results should be robust enough to be applicable to Finnish companies on average. Given this information, there should be plenty room for improvement in female labor market outcomes in a Finnish context, likely also among state-owned companies.

2.2 Finnish state-owned companies

Finnish state-owned companies can be divided into three main categories: companies owned by the central government, companies owned by the municipalities, and companies owned by the Åland government. The gender quota for company boards studied in this thesis applies to all state-owned companies.

2.2.1 Companies owned by the central government

In 2004 (one year prior to the law reform), the Finnish central government had majority ownership in 35 companies and minority ownership in 15 (Vuoria, 2004). Furthermore, some of the companies had subsidiaries, which are also under the control of the Finnish central government by extension. An example of this is Finnair Cargo, where the state-owned Finnair is the ultimate, and only, owner. Therefore, the number of state-owned companies controlled

by the central government can vary, depending on if one includes subsidiaries or not (Tuominen-Thuesen, Pekkala, Sievänen, Karlsson, Ali-Yrkkö, Pajarinen & Ahonen 2019).

Companies owned by the central government can be divided into three groups: companies that have financial interests, companies that exist for strategic purposes, and companies which complete extraordinary tasks[1]. In total, companies owned by the central government employ more than 50 000 people (Tuominen-Thuesen et. al. (2019).

2.2.2 Companies owned by the municipalities

Companies owned by municipalities are the largest group of Finnish state-owned companies. The number of municipality-owned companies has steadily risen during the last decade, and in 2017 there were 2896 companies registered, up from less than 1100 in 2004 (Mehtonen, 2019). One reason for the rapid increase in municipality-owned companies is the updated legislation. In 2013, Finland introduced law 626/2013 (lag om ändring av kommunallagen) which forces municipalities to organize their activities in registered companies to a higher degree than before. The reasoning was that all services except those that municipalities are mandated to offer (such as: education, healthcare etc.) should be subject to market-based competition, which is allegedly easier when the services are organized by a municipality-owned company.

Companies owned by municipalities are on average much smaller than companies controlled by the central government; however, they vary vastly in size, as do their purposes. Examples include (but are not limited to) local electricity suppliers, local phone companies, and property rental companies.

2.2.3 Companies owned by the Åland government

Due to its unique legal status and high degree of autonomy, the Åland government has the right to hold its own companies. In 2015, the Åland government had majority ownership in nine companies, and a minority share in five. Additionally, the central government has control over the large gambling and betting association, Penningautomatföreningen (PAF) (Ålands landskapsregering, 2015).

[1] More information, and a complete list of all government-owned companies, can be found on the Prime Minister's Office's webpage: https://vnk.fi/omistajaohjaus/enemmisto-vahemmisto-yhtiot

2.3 Legal background

To increase the representation of women on Finnish state-owned companies' boards, section 4a was introduced into the Finnish law on equality between women and men in 2005. It specifies that women and men are to be equally represented on company boards by 01.06.2005 if there are no special reasons for it to be otherwise. The law further specifies that every necessary action to achieve this should be taken up until that date (Lag om jämställdhet mellan kvinnor och män, 15.4.2005/232). This gave Finnish state-owned companies one and a half month to comply; however, many failed to do so in time.

Even though the law fails to mention any specific percentage representation target, Finnish authorities have referenced to it as a 40% minimum representation of each gender. One example is the publication on municipality-owned companies' boards by the ministry of social affairs and health (Keski-Petäjä & Katainen 2017, p. 9). The 40% representation is also arguably the norm in quota-legislation, as it is used in many European countries, e.g. Norway, Spain and France.

The origin of the law dates to at least 16.04.2003 when the government program for Vanhanen's first government was published. The program includes a section mentioning that the government will integrate the principle of gender equality in all administration; however, no specifics are mentioned (Statsrådets kansli, 2003). The original law was passed from the government to parliament on the 8th of October 2004 and is therefore unarguably the latest date on which the law has come into public knowledge. Hence, the possibility for anticipation effects dates to at least this date.

2.4 Implications from implementing a quota

The possible implications from implementing a quota are plenty. For my thesis, I have highlighted five that I deem most relevant. (i) First, the direct effect on those women who end up on company boards, who would otherwise not have been chosen for a board position. (ii) Second, the possibility of acquiring a board position creates incentives for female employees to work harder for promotions. (iii) Third, if board appointments are made through networks, having female board members will likely extend these networks to female candidates who would otherwise not have been considered. (iv) Fourth, female leaders might create female friendly business environments that fit women better, thus increasing women's opportunities

for promotions and raises. (v) Fifth, the presence of women in traditionally male dominated areas might make men change their perception of women.

The first implication only has direct impacts on the person chosen, who receives a desirable position and monetary compensation. Therefore, appointing women to boards to a higher degree than before unarguably increases women's mean wages and hierarchical status, given that the board positions are desirable.

The second implication is based in incentive theory from the personnel economics field and is often referred to as "promotion-based incentives". The theory that effort levels are positively correlated with possibilities of promotion has been studied by many, e.g. Campbell (2008). Campbell finds that fast-food managers in areas where chances of promotions are higher extract significantly more effort compared to managers in other areas. I consider a position at a company board comparable to a promotion; therefore, it is possible that a quota increases exerted effort from female employees, which in turn raises their productivity and salary, even in cases where they are not appointed to the board in the end.

The third implication is based on network theory, which assumes that networks are key factors for hiring. It also assumes that men and women have partially different networks, otherwise having women or men on the board would not make a difference regarding networks. Thus, introducing a mandatory quota could break the glass ceiling, and act as a big push which changes the equilibrium permanently. The network theory was pioneered by sociologist Granovetter (1977), who found out that networks are essential in hiring, but has also been used widely in economics since (e.g. Gemkov & Neugart 2011).

The fourth implication assumes that female leaders are better at creating a female friendly business environment than men are. For example, strategic decisions concerning company paid parental leave or childcare can be measures that a board must consider, which are likely to affect the female labor force. The assumption that women in positions of power would use it for female friendly decisions is far from certain though. Bagues & Esteve-Volart (2010) studied a randomized experiment on hiring committees in large Spanish enterprises, where the share of women on the committees varied. They found out that committees with a larger share of women hired fewer women than committees with a smaller share of women, thus comparatively preferring male candidates over female candidates. Comparable results are found in a similar study from Bagues, Sylos-Labini & Zinovyeva (2017). Relating to this, Brescoll (2011) finds out that women in positions of power voice their opinions significantly less than men in

similar positions. The results from these studies show that the effects from mandating female representation can be counter-intuitive in some cases, which adds to the topics complexity.

The fifth assumption is based on the theory that introducing women into traditionally male dominated areas will change men's perceptions of women in general. Dahl, Kotsadam & Rooth (2018) find interesting evidence for this in their randomized controlled trial on Norwegian conscripts. They find out that assigning women to squads during boot camp improves the perception of women among males in the treated squads, even regarding tasks that are unrelated to the military. For example, they find an eight percentage point increase in males answering "yes" to the question if it is "*important to share household work equally"*. This evidence suggests that adding women to company boards might lead to overall positive attitude changes toward women among male board members. Similar results are also found by Beaman, Chattopadhyay, Duflo, Pande and Topalova (2009) in their study on how exposure to female leaders in Indian village councils affected citizens' perceptions of female leadership.

Furthermore, there is a possibility that implementing a quota will have negative effects on female labor market outcomes. If there are not enough qualified women available, negative stereotypes against women might be created or reinforced when unqualified women are hired. Moreover, Coate & Loury (1993) find that a quota might create a "*patronizing equilibrium"*, where the affirmative action group (in my case: women) might have less incentives to acquire skills, due to the easier path to a board position. This might lead to less exerted effort by women that are considered for these positions, which might have other spillover effects such as reinforcing stereotypes.

3. Previous Research on Gender Quotas

3.1 Bertrand, Black, Jensen and Lleras-Muney

Bertrand et.al. (2018) researches what effects the Norwegian quota has had on female labor market outcomes, using the same instrumental variables approach as I do. The Norwegian quota differs from the Finnish in several aspects, mostly by applying to public limited companies (allmenaksjeselskap, "ASA"). It was written into law in 2003; however, most companies failed to comply at first. Therefore, the Norwegian law was amended in 2005 with a section stating that companies who failed to comply with the 40% representation requirement risked facing forced dissolution. In year 2008, compliance was close to full, which assured a strong first stage for their analysis. Bertrand et.al. (2018) researches many more labor market outcomes than I do. First, they find out that the newly appointed women were at least as qualified as their male peers on average, based on observational characteristics. Second, they find out that the average earnings for newly appointed female board members rise significantly as a result of an appointment. Third, they research how female labor market outcomes inside treated companies change based on the gender composition of boards, which is what I research in my thesis.

Bertrand et.al. (2018) divide their analysis into business groups and company-level models due to the complexity of ownership structure in Norwegian companies. Additionally, they perform the analysis on so called "intent-to-treat" companies to check the robustness of their results. "Intent-to-treat" companies are companies that changed their legal status away from public companies when the law was changed. According to the authors, there were a substantial amount of such re-registrations in connection to the law reform.

Bertrand et.al. (2018, table 6) find out that most results were statistically insignificant and small. All outcomes that I replicate, except *share of women among top 25 percent of earners* yield insignificant results, and the result for the only significant coefficient is negative. That is, adding women to boards *reduced* the share of women among top 25 percent of earners. Bertrand et.al. conclude that the quota had little to no effect on female labor market outcomes in Norwegian public limited (ASA) companies.

3.2 Other previous research on gender quotas

Matsa and Miller (2013) studies the Norwegian quota's impact on labor costs and employment levels in Norwegian companies, using a difference-in-differences approach comparing Norwegian companies with their Swedish, Danish and Finnish peers. They found out that companies which had few or no female board members pre-quota saw a 4,1% increase in labor costs and a significant reduction in short-term profits, post-quota. They argue that the increase in costs is due to differences in female and male leadership. Matsa and Miller do not distinguish whether the increase in labor costs originate from increased male, female, or overall wages, nor if it is the result of avoided lay-offs.

Other studies have researched the effect of gender quotas on financial targets (e.g. Reguera-Alvardo et.al. 2017 in a Spanish context). There are also several studies researching how diversity in company boards affect financial targets (such as: Carter et.al. 2008 in Oklahoma). However, I am yet to find another study (except Bertrand et.al. (2018)) that researches a gender quota's effect on female labor outcomes. To my knowledge, there has also not been any empirical research on how gender quotas affect female labor market outcomes in a Finnish context prior to this thesis.

4. Data and Methodology

4.1 Methodology

The main empirical strategy of this thesis is to run instrumental variables regressions for all outcome variables. The treatment variable is the board's gender ratio, which is instrumented for by the pre-reform gender ratio interacted with year dummies. The main assumption is that the law reform affects companies with a low share of female board members more than companies with a high share of female board members, as companies with a low share have to make larger changes in board structure compared to companies with a high share pre-reform. This asymmetrical increase is crucial for the research design to work as intended, as the difference in increase is utilized to analyze the effect of the treatment. Furthermore, I cap the maximal "bite" of the reform to 40%. In other words, the maximum effect the reform can have on a board composition is an increase of 40 percentage points, as any change that increases the share of women to over 40% is voluntary. Even though the Finnish reform fails to mention any specific share of women required, I choose to use 40% as my threshold, as at least one Finnish ministry refers to it (Keski-Petäjä & Katainen 2017, p. 9), and it is the norm in European quota-legislation. The methodology is identical to Bertrand et.al. (2018), and therefore allows me to make direct comparisons between my results and theirs.

My main regressions use the gender composition on boards in 2004 to instrument the treatment. Year 2004 is one year prior to the reform and should provide the best instrument assuming there are no meaningful anticipation effects. Such anticipation effects could be that companies which need to appoint new board members in the years prior to the reform take the reform into account in their hiring process. Therefore, they would be more likely to employ a woman over a man, even though the reform had not been written into law at that point in time. I also run regressions using the 2003 and 2005 board gender composition as instruments to allow for deeper analysis of possible anticipation effects.

Furthermore, I choose to run reduced form estimates on yearly interaction dummies to get a better understanding of my results. This enables me to analyze the effects of the treatment on a year-to-year basis, which can be interesting, given that the effects might for example be lagged. Moreover, this approach allows me to plot event study graphs, which visualize the results clearly. Additionally, I run reduced form regressions on a post-treatment dummy, effectively providing the average result from the interaction dummies. Reduced form estimates

are interesting because they include all effects of the reform, regardless of the channel. There is a possibility that the reform affected female labor market outcomes through other channels than the treatment (the board gender composition), which will be reflected in the reduced form estimates but would not be seen in the main regression results. For example, it could be possible that the law reform created awareness toward female labor market outcomes, which made companies with a low share of women on their board increase salaries for women relatively more than companies that had high representation of women on their board pre-law. In that case, the law reform has impacted the measured outcomes, albeit not through the obvious channel (by increasing the share of female board members). Conversely, if there is no impact in the reduced form estimates, any effect of the treatment likely is not there.

To analyze the viability of my instrumental variables approach, I choose to run and report first-stage regressions, which show how the pre-treatment board gender composition affected how the share of women on company boards increased on average. Furthermore, I plot the first-stage results in an event-study style graph, to see if there were any significant pre-trends that must be accounted for. Additionally, I report the Kleibergen-Paap F-statistics to analyze whether there is enough variation within the sample to ensure the viability of my approach.

I also run OLS-regressions on all outcome variables to see if there are any meaningful correlations between the treatment and outcomes. A high correlation would indicate that the possibility of a causal effect is higher; however, even if the correlation is low, a causal effect is not ruled out entirely. An example of the latter could be a scenario where companies with a high share of women on the board are less likely to score high on the outcome variables, while an increase in the share of women on the board would still lead to improvements in the outcome variables.

Additionally, I choose to run all regressions on a limited sample consisting of only government-owned companies, as they are different from municipality-owned companies in many aspects. I limit the sample in this way to see if there are any differences between how the different forms of state-owned companies reacted to the law reform.

I choose to include state-owned companies' subsidiaries in my sample. The subsidiaries are equally affected by the quota and must therefore also adjust their board gender composition accordingly.

4.2 Data

My data is from Statistics Finland and includes micro-level registry data. This allows me to identify what company an individual has worked for during a given year. Furthermore, I can obtain information about the individual's salary, educational status, marriage status, number of children, age and more[2]. Additionally, I have access to the Finnish Patent and Registration database on all registered companies' board compositions. By combining these datasets, I can calculate the share of women in different income percentiles inside a given company at a given year and identify the gender composition of a company's board for each year. I choose to use a dataset from 1997-2017, which allows me to analyze the effects twelve years post reform and the pre trends eight years prior to the reform, which I argue is long enough for a relevant pre trend analysis. For a company to be included in the regressions, it needs to have a registered board in the instrumented year, which is 2004 in my main model. The number of municipality-owned companies have more than doubled since 2004; hence, the number of observations might seem low when comparing to today's company numbers but is nevertheless sufficiently large for this study.

Appendix table A1 provides a list of control variables that are used in the main regressions with time-varying controls. Compared to Bertrand et.al. (2018), I lack controls for the share of employees in twenty different industry categories, as I am not able to identify different industry categories inside a given company. Instead, I control for the company-level industry category by using the two-digit level TOL02 codes provided by statistics Finland. Moreover, I am also unable to identify the share of employees with MBA degrees, as MBAs are not distinguished from other tertiary education in the statistics Finland dataset. However, all other controls are provided and controlled for.

For a deeper understanding of the data, appendix tables A4-A8 provide summary statistics for the sample.

4.2.1 Descriptive statistics

All descriptive graphs and tables are based on the sample that is used for the regressions. Hence, all companies that did not exist in 2004 are omitted. Figures one and two below visualize the gender disparity in income in Finnish state-owned companies from 1994-2017. The gap is

[2] The full set of control variables that I use in my regressions can be found in the appendix table A1

significant and persistent during the timeframe, both regarding the mean and the 90th percentile. The pattern very closely resembles what Bertrand et.al. present in their paper (2018, p. 199).

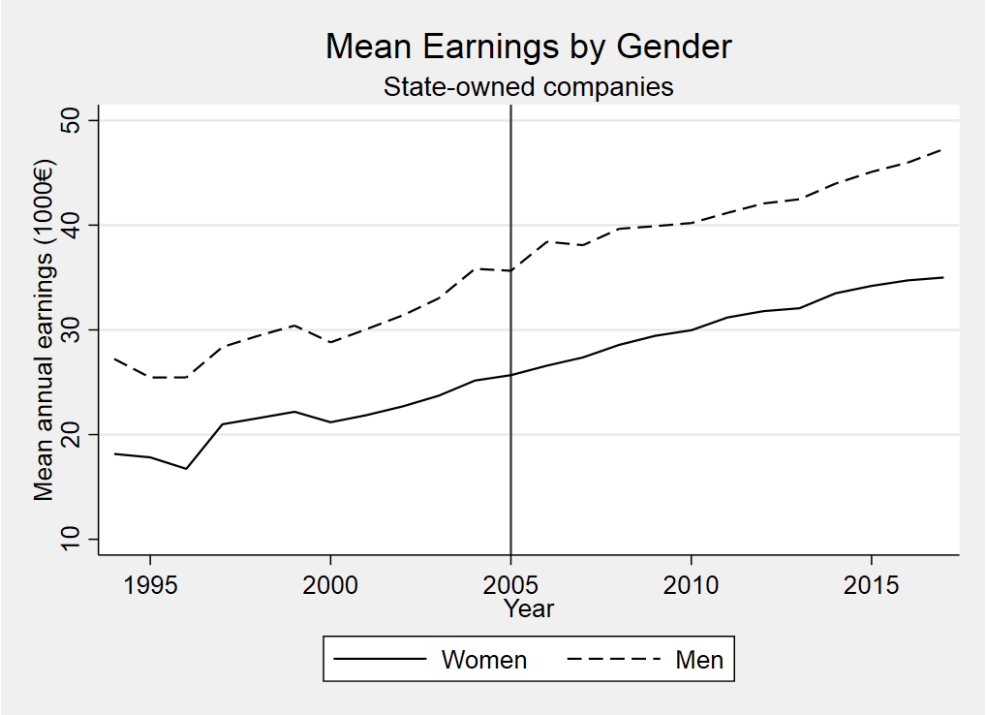

Figure 1 – Mean earnings by gender

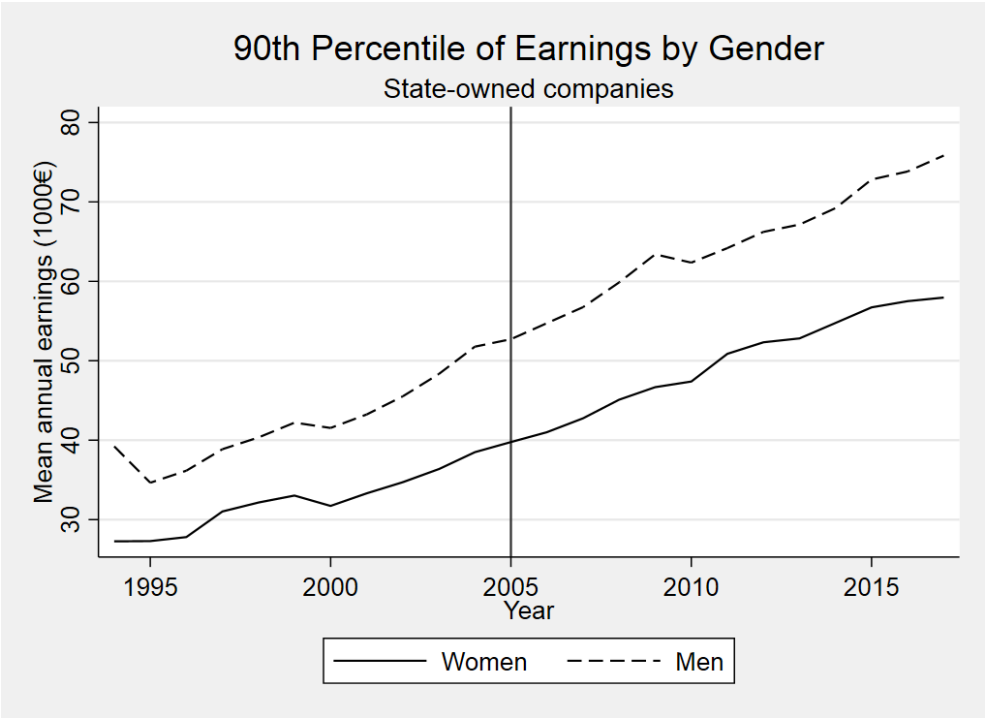

Figure 2 - 90th percentile of earnings by gender

Figure three visualizes the average share of women on company boards in state-owned companies from 1994-2017. The figure shows that state-owned companies fail to comply with equal representation on boards during the whole timeframe on average, even if they do maintain an upward sloping trend. The implications of this is discussed more thoroughly under the limitations sub-chapter. Companies are weighted equally in figure 3, while they are weighted on employee count in the regressions. This fact is important in understanding the setting, as my data shows that government-owned companies had on average 430 employees in 2004, while the equivalent number is 19.3 for municipality owned companies.

Companies owned by the Åland government are omitted from figures 3-5 because there are so few of them that it would be possible to identify single companies from the trend, which is against the rules set by statistics Finland.

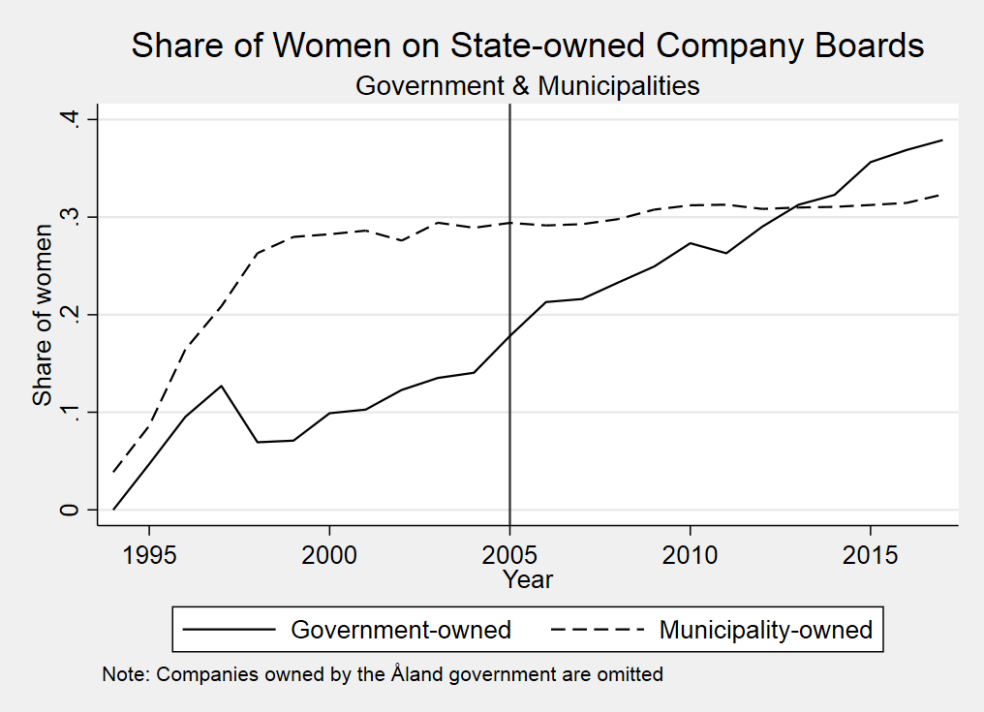

Figure 3 - Sex ratio on state-owned company boards in Finland

Figure four plots companies in different quintiles by female board member share in 2004 and 2014. The figure shows that the share of companies with very few women on their board (0 – 20 %) has decreased significantly among government-owned companies but stayed relatively steady among municipality-owned companies. As the median board size in 2004 were five and four respectively, companies in the first quintile had zero female board members, while most companies in the second quintile had one female board member, and so on. However, if the board had six or more members, which became the norm in 2014, the company is placed in the first quintile if they had one woman on their board, which explains the relatively high share of companies in the first quintile in 2014[3].

The figure also shows that many companies still did not comply in 2014, even though the average share of women on boards increased. Figure four also shows that there are companies where the share of men on company boards is too low. The quota specifies that there should be an equal representation of both men and women; hence, companies with a too high share of female board members need to reduce the share of women on company boards to comply with the quota. In figure four, these companies are represented in the last quintile. If the share of companies with this opposite situation would be high, it would invalidate my methodology, as

[3] See appendix tables A4-A8 for more thorough statistics.

I assume the quota would only increase the share of women on company boards. However, the number of companies which need to reduce their share of women is low enough for me to argue that it is irrelevant for this thesis.

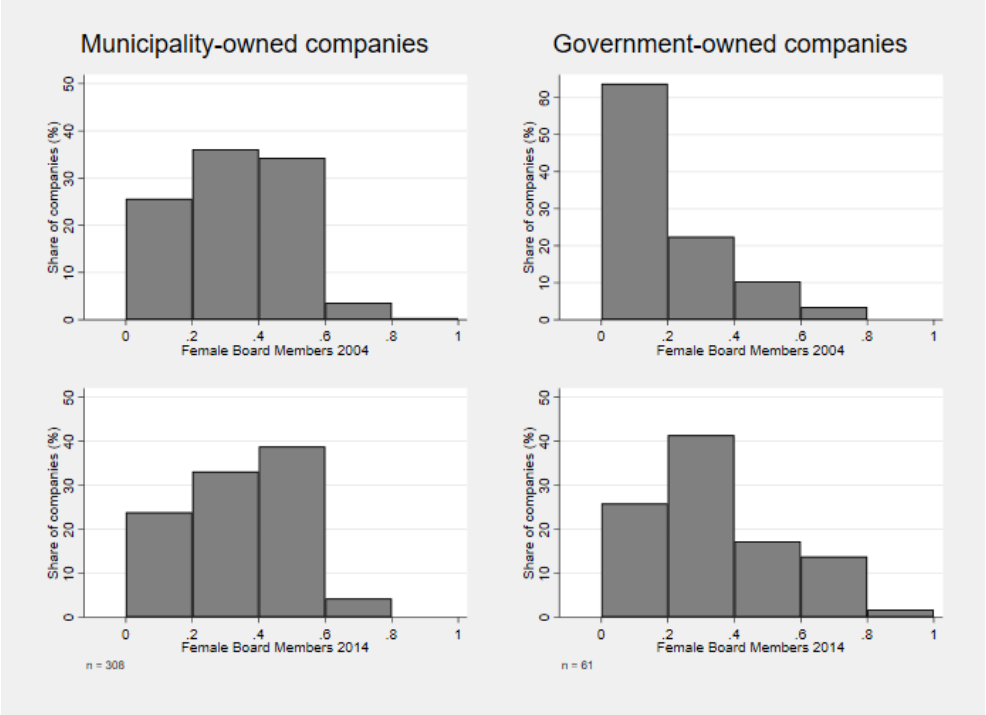

Figure 4 - State-owned Companies per Quintile Female Board Members

Figure five plots the share of companies by the number of female board members in 2004 and 2014. Unsurprisingly, the trend is very similar to figure 4, which plots the share of female board members instead of absolute numbers. The figure shows that nine years after the implementation of the board quota, there is a large drop in the share of companies with 0 female board members; however, compliance is far from full.

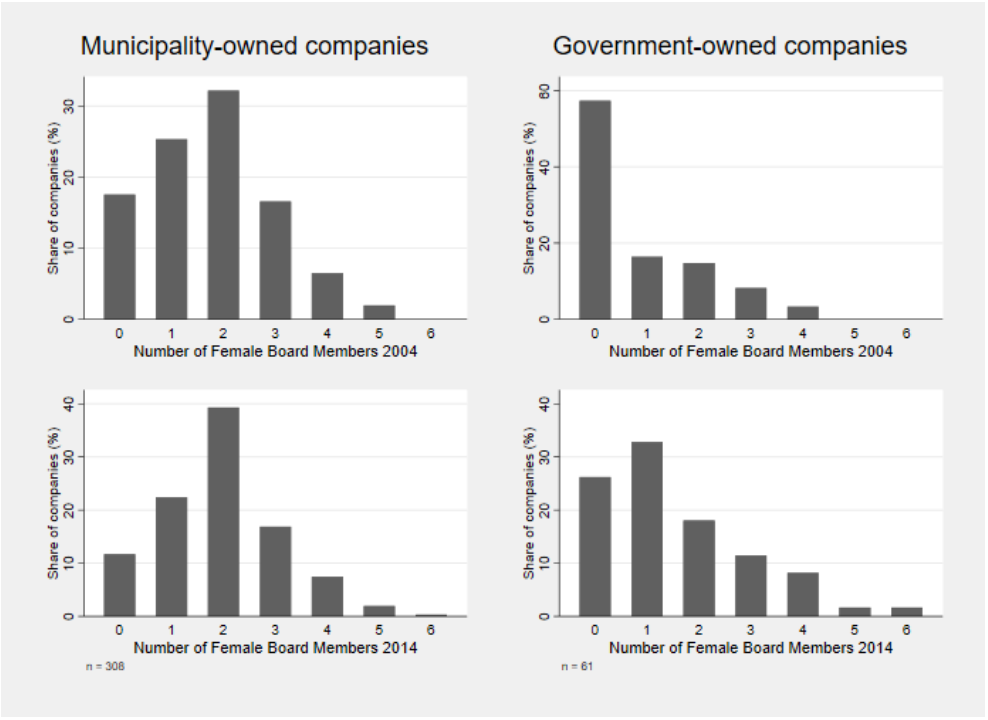

Figure 5 - Number of women on company boards

Figure six plots a time-series which is similar to figure three, but instead of dividing companies into government-owned and municipality-owned, it plots them per bite-level. Figure five shows that companies with a full bite (i.e. zero women on the board in 2004) increase their share of women on boards more than their peers with lower bites, which is a requirement for the research design to work. However, some part of this faster increase is likely due to so called "mean reversion", as companies with 0 women were outliers to begin with. Moreover, companies with a high bite do not increase their share of women on boards significantly more or faster than companies with a low bite, indicating that the law reform might not have the asymmetrical effect it needs to have in order for the research design to work as intended.

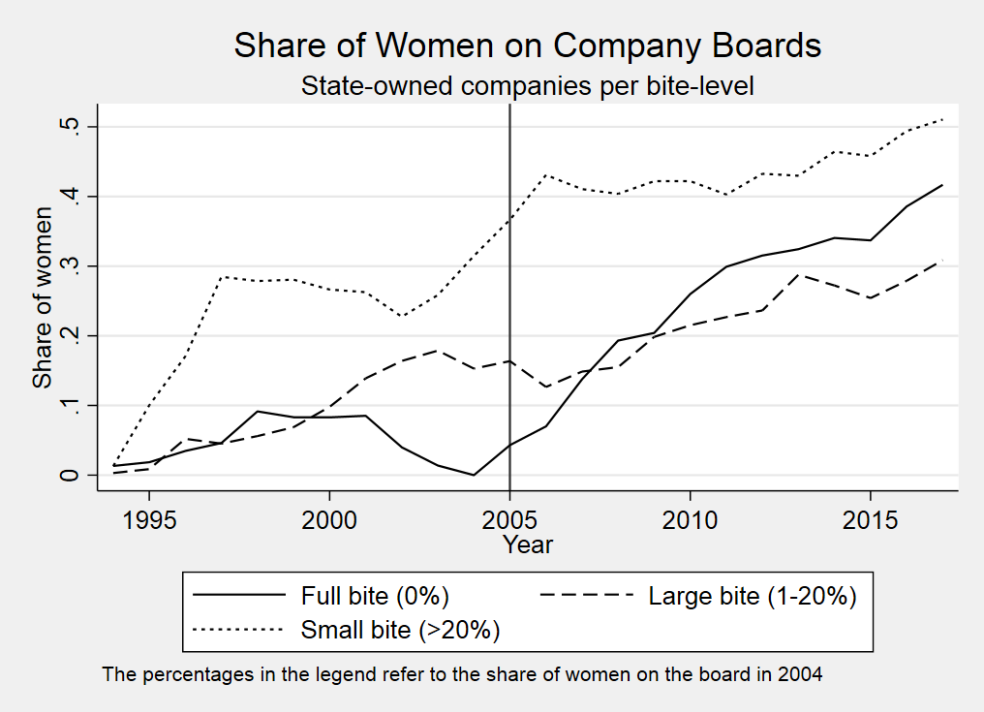

Figure 6 - Share of Women on Company Boards per Bite-level

4.3 Limitations

Just as Bertrand et.al. (2018, p. 216) does, I identify the possibility that companies with a different share of women on boards were also different in "female friendliness" pre reform, differing in working conditions for women. If companies with a higher share of female board members pre reform were more "female friendly" in working conditions, it might attenuate my effects. The rationale is that the efforts to improve working conditions for women that are unrelated to the gender composition of the board, are impossible to control for in the regressions. Hence, my estimates would violate the exogeneity assumption, as the treatment would not be randomly distributed. A violation of the exogeneity assumption can bias the results in any direction, depending on how the bias acts. An intuitive example would be that companies with a large female representation on company boards prior to the quota, would also be more likely to have implemented reforms that improve female labor market outcomes over time, already before the quota. Therefore, the results would be downward-biased, as the female labor market outcomes improve due to previous measures taken, without an increase in the female board member share.

I also identify the risk for a violation of the exclusion restriction, especially concerning the regressions on the number of women among top five earners and in the 95th percentile. The law reform created a need to employ more women to company boards, and I see a possibility that some of these women were employed by the company before the reform. Being a board member is often a desirable position, thus it is not unlikely that the women chosen were among the best earners inside the organization pre-quota. If that is the case, the instrument has directly affected the outcome variable by removing high earners from the organization, hence biasing the estimates negatively.

The Finnish reform was written into law in June 2005. Therefore, I have chosen 2004 as the baseline year for my instrument. It is possible that choosing the year so close to the reform biases my estimates negatively, as it might ignore anticipation effects. The reform was publicly known well before the actual date, as it was prepared and discussed in parliament, which means that some companies might have taken it into account already before the reform was written into law. Companies that needed to appoint new board members in 2004 might for example have chosen a woman instead of a man, because they knew that they had to comply to the new reform in a later stage. If that is the case, my results are underestimated.

There is an evident and likely risk that many of my time-varying control variables are endogenous. Bertrand et.al. (2018) notes this in their paper, but argues that their results are interesting, nonetheless. Control variables such as: *share of employees with a graduate degree that are women*, are likely to be affected by the treatment, which makes them endogenous. In Bertrand et. al. (2018)'s case, the estimates are consistent regardless if the controls are included or not, therefore they act as a robustness check which validates the results. One option to overcome the endogeneity problem could be to use the pre-reform numbers for the supposedly endogenous variables. That would eliminate the concern for endogeneity, but also reduce the impact of the controls, as they would not be time varying. This method is discussed by Deuchert and Huber in their paper on control variables in IV-estimation (2014).

5. Results

5.1 First stage and F-statistics

The first stage regressions presented in table 1 find positive, but mostly insignificant and small results, indicating weak instruments. The results suggest that Finnish state-owned companies with few women on the board pre-quota did not increase their share of female board members significantly more than Finnish state-owned companies with many women on the board pre-quota. The insignificant first stage has negative implications for a potential causal interpretation of the main regressions, as a strong first stage is a requirement for the viability of instrumental variables regressions.

The effect of the treatment is understood by multiplying the results in the table by the bite of the reform. The bite of the reform is defined as:

$$Bite = (0{,}4 - \text{percentage women on board in 2004});\ Bite \geq 0$$

The following example is intended to clarify:

If the hypothetical company X had a female board member share of 0% in 2004, they have a bite of 0.4. If one is interested in how the quota affected company X's board gender composition in 2010, one multiplies the coefficient (Table 1, column 1, row 2010), which is 0.299, with 0.4, and receives 0.1196. Hence, company X (and other companies with 0 women on their board in 2004) have experienced a 11.96 percentage point increase in female board members by 2010, on average.

My main regression (table 1, column 1) only scores a 3.629 F-statistic, which is low. The general target is that F-statistics below 10 indicate that instruments are weak. The corresponding F-statistics for all other columns are also low, meaning that none of the alternative instruments work better, nor does limiting the sample to only government-owned companies.

TABLE 1

First-stage regressions

Dependent variable: Percentage women on board				
Instrument Year	2004	2003	2005	2004
	(1)	(2)	(3)	(4)
Percent women on board in				
2005	0.127	0.148	-0.335***	0.113
	(0.181)	(0.163)	(0.0645)	(0.230)
2006	-0.0766	0.00919	-0.379***	-0.168
	(0.142)	(0.125)	(0.0940)	(0.172)
2007	0.214*	0.301***	-0.143	0.166
	(0.122)	(0.0899)	(0.144)	(0.151)
2008	0.292**	0.375***	-0.0674	0.252*
	(0.122)	(0.0923)	(0.151)	(0.150)
2009	0.189	0.192	-0.121	0.120
	(0.132)	(0.117)	(0.133)	(0.161)
2010	0.299	0.179	-0.0575	0.228
	(0.189)	(0.113)	(0.140)	(0.221)
2011	0.339*	0.279**	-0.0883	0.248
	(0.190)	(0.132)	(0.187)	(0.228)
2012	0.314	0.0856	-0.108	0.195
	(0.243)	(0.246)	(0.157)	(0.297)
2013	0.605**	0.159	0.0733	0.495
	(0.297)	(0.278)	(0.151)	(0.357)
2014	0.409	0.437	-0.222	0.175
	(0.319)	(0.414)	(0.300)	(0.397)
2015	0.413	0.563	-0.0985	0.186
	(0.272)	(0.430)	(0.327)	(0.350)
2016	0.281	0.271	-0.184	-0.00363
	(0.337)	(0.609)	(0.283)	(0.438)
2017	0.430	0.462	-0.191	0.188
	(0.270)	(0.352)	(0.294)	(0.338)
Year and company fixed effects	Yes	Yes	Yes	Yes
Instrument year	2004	2003	2005	2004
Only government-owned companies	No	No	No	Yes
F-Statistic	3.629	3.916	4.679	4.192
Observations	5 383	4 980	6 941	1 007

Notes: Standard errors clustered on company level in parentheses. F-statistics used are Kleibergen-Paap due to the heterogeneity in the sample. All regressions are weighted on company employee count. Standard errors are clustered on the company level. *** p<0.01, ** p<0.05, * p<0.

Even though the results are weak across the board, the first stage is arguably strongest in the main regression, column 1, which suggests that using the 2004 gender board composition as an instrument is the right choice. The weak first stage in column 4 (only government-owned

companies) is somewhat surprising, considering figures 3-5, which show that government-owned companies have increased their female board member share much more than municipality-owned companies. It is therefore evident that government-owned companies have not increased their share of female board members asymmetrically, which would be needed for a strong first stage to occur.

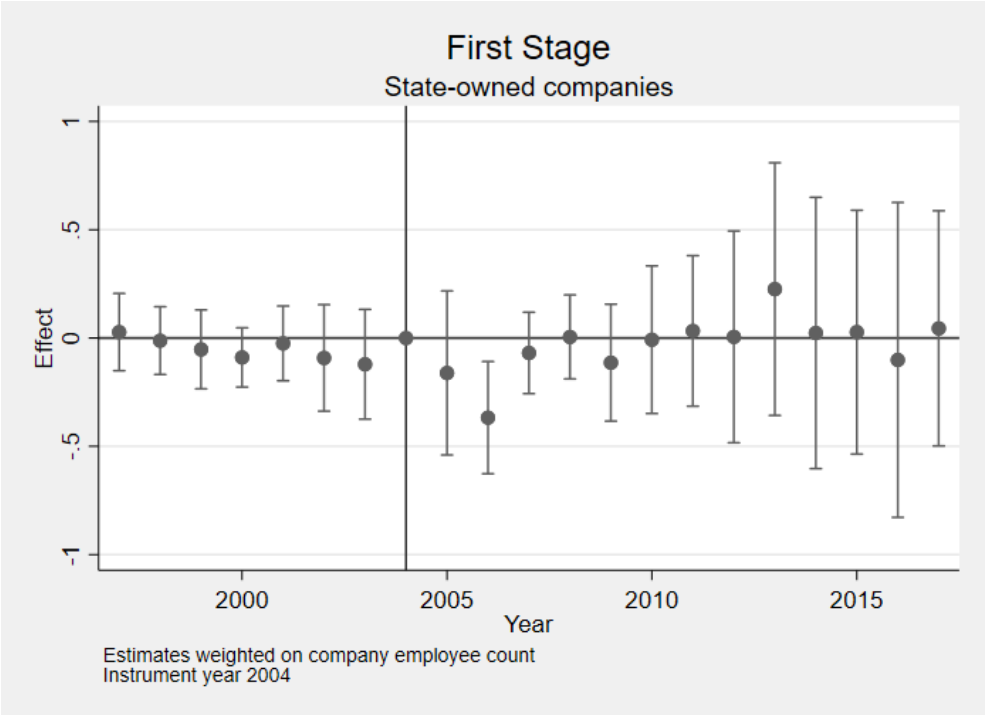

Figure 7 - First Stage Plotted as an Event Study

Once plotted as an event study, the insignificant first stage is visualized. When comparing the pre- and post-periods, there are no clear differences in trends, which would be necessary for a significant first stage to exist. Figure 7 therefore confirms that the first stage is too weak for any causal interpretation of the instrumental variable regression results (which are presented in table 2).

5.2 Reduced Form

The reduced form results are presented in appendix table A3. All results are read the same way as in table 1, i.e. by multiplying the coefficients with the corresponding bite. Hence, the highest possible effect is the coefficient multiplied by 0.4 (the maximal bite). The results in table A3

are all insignificant, and some are negative. The results indicate that the quota had no positive effects on female labor market outcomes, regardless of channel.

I have visualized the reduced form estimates on a year-to-year basis in figures 8-12. The vertical line indicates the omitted year 2004, which was chosen as the instrument. The purpose of the figures is to visualize and compare the pre-trends to the post-trends.

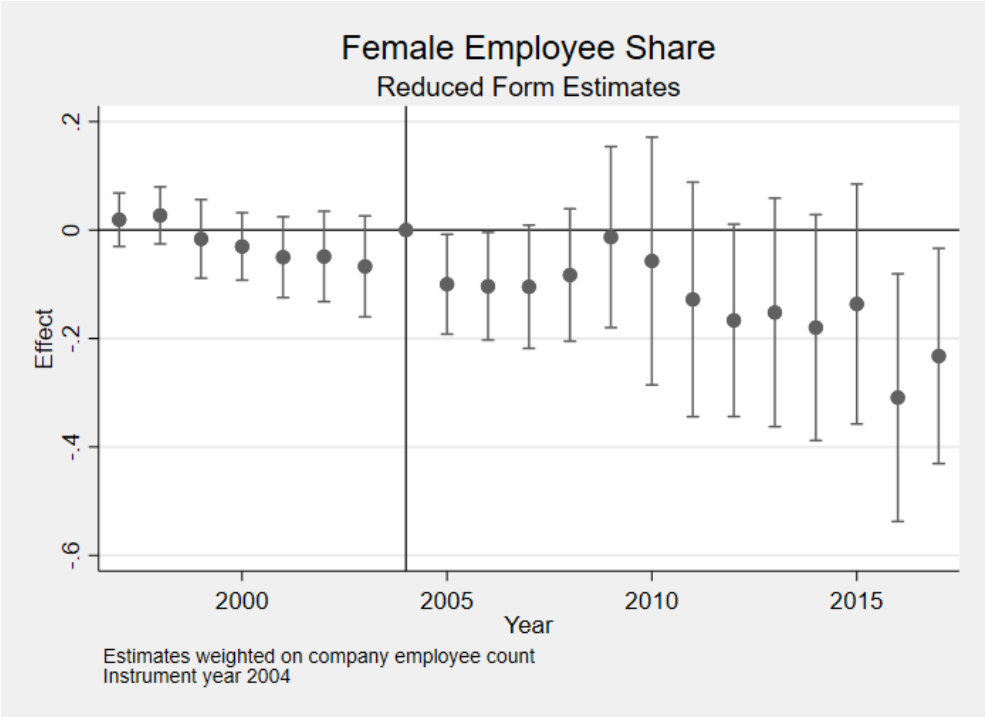

Figure 8 - Female Employee Share

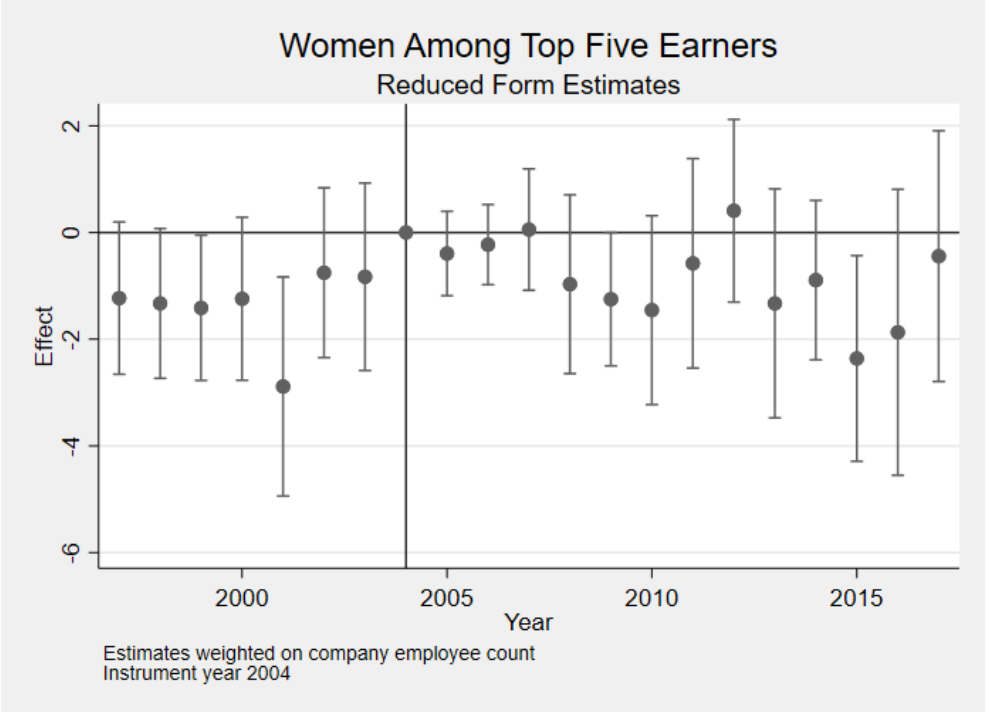

Figure 9 - Women Among Top Five Earners (Number)

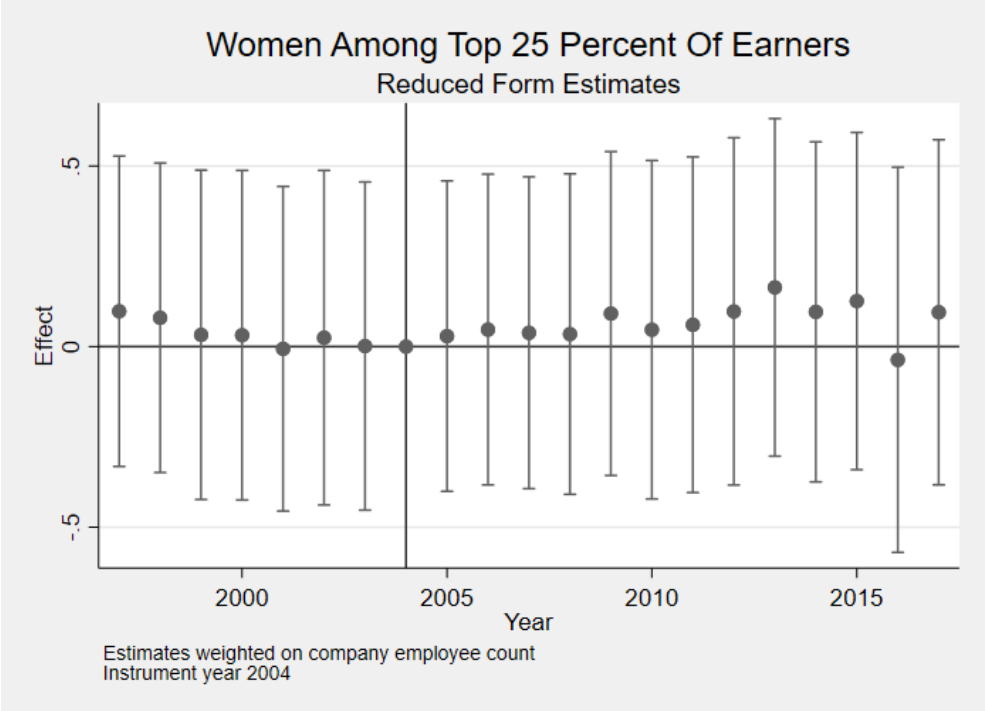

Figure 10 - Women Among Top 25% of Earners

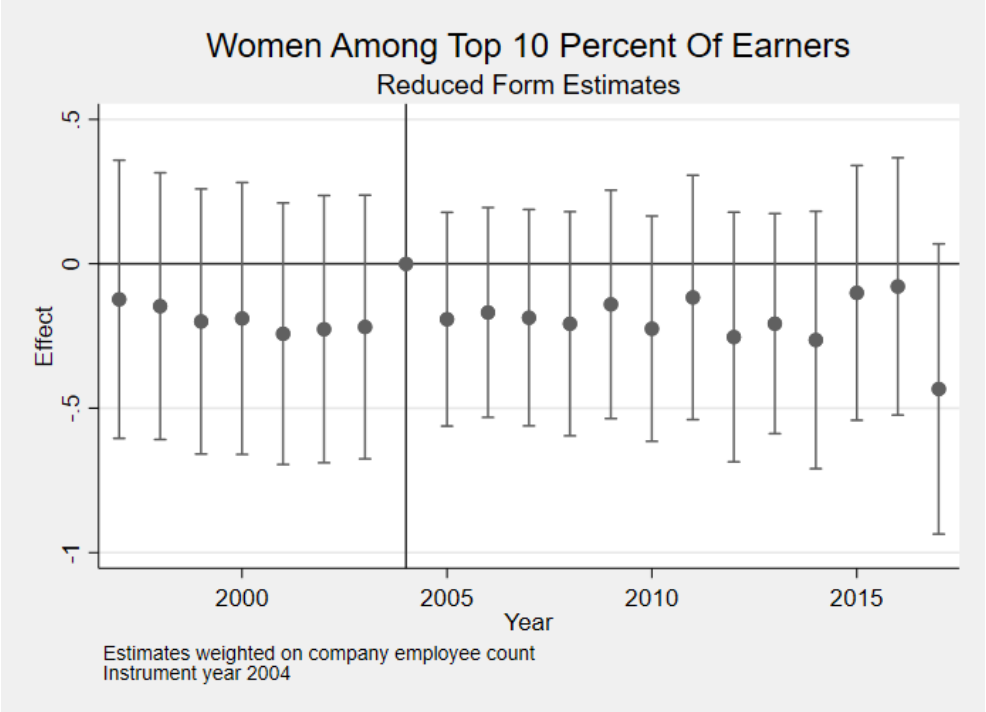

Figure 11 - Women Among Top 10% of Earners

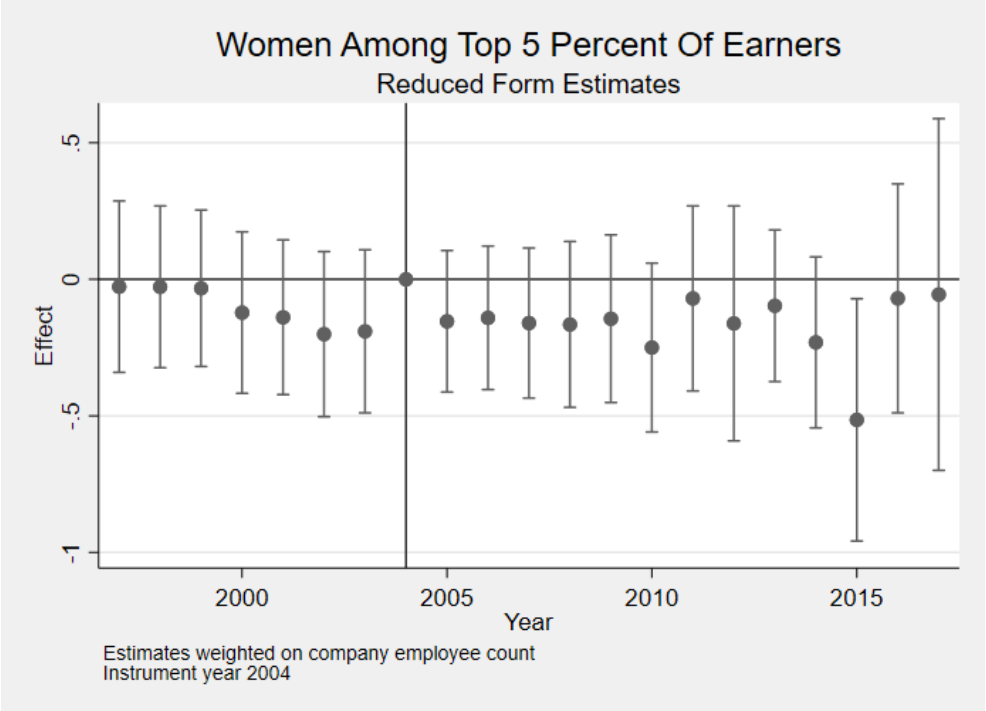

Figure 12 - Women Among Top 5% of Earners

None of figures 8-12 show significant changes in the outcome variables. All pre-trends are similar to the respective post-trends, implying that the law reform had no effect on the measured female labor market outcomes.

Figure 8 plots a negative trend, which implies that companies with a low share of female board members in 2004 have fared relatively worse in increasing the female employee share both before and after 2004, when compared to companies with a high share of female board members in 2004. The estimates are relatively precise, considering figure 8's small confidence intervals compared to the other figures.

Figures 9-12 plot consistent, horizontal trends. However, the confidence intervals are all relatively large, which means that we cannot discard the possibility of meaningful changes in pre- and post-trends. Although, given how consistent the trends are across years and outcome variables, it is unlikely that there would be any causal effect even if the model would plot more precise estimates, especially considering that the outcome variables are likely to be correlated to a high degree.

Figure 9 differs from the other figures in that the y-axis shows absolute values, not percentages. Hence, the figure plots how the reform affected the number of women among top 5 earners, not the share of women among top 5 earners.

The reduced form results in appendix table A4 together with figures 7-11 show that the reform is unlikely to have had any effect on the measured female labor market outcomes, regardless of channel.

5.3 Main table

My main results are presented in table 2 below. The table shows results in five outcome variables using three different years as instruments. Panel A shows my main regressions using the 2004 gender composition on boards interacted with year dummies as instruments. The odd columns in panel A do not include time-varying company controls, while the even-numbered columns do. Panel B shows alternative regressions which use the 2003 and 2005 gender composition on boards as instruments.

Like in all previous tables, the table is understood by multiplying the coefficients by the bite the companies faced in the instrumented year.

Table 2

Effect of board gender quota on female outcomes in Finnish state-owned companies. Instrumental variables regressions

Panel A: Main Regressions

Dependent Variable	*Female Employee share*		*Share of female employees with earning above the … in the earnings distribution*						*Number of women among top 5 earners*	
			75th percentile		*90th percentile*		*95th percentile*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Percent women on board in year t	-0.0937	0.135*	0.173	0.124	-0.180	-0.156	-0.152	-0.200	-1.379	-0.162
	(0.153)	(0.0698)	(0.175)	(0.124)	(0.177)	(0.163)	(0.194)	(0.180)	(1.988)	(1.873)
Time-varying company controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Instrument year	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
Observations	4,893	4,893	4,893	4,893	4,893	4,893	4,893	4,893	4,893	4,893
R^2	-0.040	0.511	0.042	0.152	0.010	0.055	-0.010	-0.005	-0.119	0.110

Panel B: Alternative Instruments

Dependent Variable	*Female Employee share*		*Share of female employees with earning above the … in the earnings distribution*						*Number of women among top 5 earners*	
			75th percentile		*90th percentile*		*95th percentile*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Percent women on board in year t	0.0452	-0.0616	0.130	0.0894	0.00638	0.0361	0.0672	0.0108	-0.163	-1.652
	(0.110)	(0.0708)	(0.174)	(0.0992)	(0.155)	(0.151)	(0.223)	(0.148)	(1.473)	(1.841)
Time-varying company controls	No	No	No	No	No	No	No	No	No	No
Instrument year	2003	2005	2003	2005	2003	2005	2003	2005	2003	2005
Observations	4,549	6,459	4,549	6,459	4,549	6,459	4,549	6,459	4,549	6,459
R^2	0.119	-0.000	0.095	0.094	0.037	0.027	-0.005	0.010	0.001	-0.170

Notes: Estimates are based on a sample containing data from Finnish state-owned companies from 2005-2017. All regressions include company fixed effects, year fixed effects, and controls for company-specific industry categories. Time-varying company controls are listed in the appendix table A1. Observations in all columns are weighted on the number of workers in each company. Table 1 reports the first-stage regressions. Results for regressions including only government-owned companies are presented in appendix table A8.

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered on the company level

I consistently find insignificant results across all outcome variables in all regressions. My results do not differ significantly when using different instruments; hence, any meaningful anticipation effects can likely be ruled out. Moreover, the low F-statistics and the weak first stage indicate that my instruments are too weak for any causal interpretation of my findings. Therefore, the numbers in the table are more suggestive than definite.

Results for regressions with a sample limited to only government-owned companies are presented in appendix table A8. Limiting the sample to government-owned companies does not yield any meaningful changes in outcomes. All results stay insignificant, and considering the weak first stage, they do not provide any causal results either.

6. Discussion

6.1 Comparison to Bertrand et. al. (2018)

Given the large similarities between this thesis and Bertrand et.al. (2018), there would be strong grounds for direct comparisons between the results if my research design would work as intended. However, the weak first stage and the low F-statistics prove that the instruments used are not viable in this context. Consequently, no direct result comparisons can be made. The main table in my thesis cannot provide any causal results, while the Norwegian counterpart can.

The reasons for the failed research design in Finland are low compliance with the law, and the absence of an asymmetrical increase in female board members among companies of different bite-levels. In contrast, Norwegian companies comply to a very high degree. The average share of women on company boards during the post 2008 period (when the Norwegian quota had legal consequences) is very close to 40% among all companies, regardless of the pre-quota gender ratio (Bertrand et.al. 2018, p.234, column 6). In comparison, Finnish state-owned companies fail to reach 40% on average in every year. Moreover, there is no significant difference in increase in the share of women on company boards when comparing companies with different pre-quota gender ratios on their boards. An asymmetrical increase would be essential for my instruments to work as intended.

Adding to the paragraph above, Ahern & Dittmar (2012) find out that Norwegian companies that had a low share of women before the quota were more likely to change their legal status away from public limited companies, presumably to avoid the quota. Furthermore, new companies registered as private limited companies to a higher degree compared to public limited companies during the post quota period. Given this information, the first stage in Bertrand et.al. (2018) might be weaker than presented if one would account for companies changing their legal status and new entrants; however, it is impossible to find conclusive evidence that companies changed their legal status due to the quota, and not for any other reason, even though it is very likely. Regardless, Bertrand et.al.'s study finds relevant results that can be applied to those companies who did not change their legal status. Finnish state-owned companies do not have the option to change their legal status in order to avoid the quota; thus, it is of no concern for this thesis.

6.2 Non-compliance

The most straightforward possible reason for non-compliance with the quota, is that there are no written legal consequences for Finnish state-owned companies if they fail to comply. Similarly, Norwegian ASA companies did not comply in large scale until they were threatened by forced dissolution. Though the legal form is different, I still find it possible that Finnish companies did not comply because there were no sanctions. I identify the possibility that persons in charge of board appointments ignore the law, because they prefer the status quo for any given reason, or value the expected returns from appointing a man over a woman higher than the risk of repercussions.

A further possible reason to why companies did not comply could be that there actually were *special reasons for it to be otherwise*, as stated in the law as the only reason for not complying. The Finnish law's vague wording allows for a smaller share of women, without further specifying what these reasons may be, and could hence play an important role in explaining the non-compliance.

Most of the studied municipality-owned companies are small and have few employees. Many are also based in rural municipalities. I find it plausible that there in many cases were not enough qualified women applying for board positions in such companies, as they might neither be attractive nor lucrative positions, for example in comparison to Norwegian ASA companies. If there are not enough qualified women interested in the board positions, that might be a *special reason for it to be otherwise*, and therefore explain the non-compliance. However, while this reasoning could perhaps explain some of the non-compliance among small municipality-owned companies, it does not explain why companies owned by the central government do not. I do not consider it plausible that there would not be enough qualified women applying for these positions, as they are most likely lucrative and attractive positions. Furthermore, Bertrand et.al. (2018) find out that women hired on company boards on Norwegian ASA-companies post-quota were more qualified than their male peers based on observable characteristics. I find it unlikely that there would be significantly less qualified women in Finland given the cultural- and demographic similarities between the nations. Nevertheless, the fact that there would be a distinct lack of qualified women for the positions is a possibility and should be accounted for until further research on that specific question has been made.

I also do not discard the possibility that some people in charge of appointing board members were not aware of the quota during the studied timeframe. Based on google searches and news articles published closed to the law's date, I conclude that the quota was likely not a topic of larger national debate. Hence, it is possible that many companies were, and possibly still are, unaware of the quota. I find this hypothesis more likely for small municipality-owned companies in comparison to large companies owned by the central government, as the resources available and the level of governance differ much between the two different ownership structures.

Another possibility for the non-compliance could be that Finnish state-owned companies interpret the term *equally represented* differently than I do. Regarding quotas, a 40% minimum representation is generally considered the norm. However, it is possible that Finnish state-owned companies might e.g. consider a board where both genders are represented an *equal representation,* regardless of the ratio. To my knowledge, Finnish courts have not tried the clause specifying the quota. Hereby, it is possible that alternative understandings of equal representation are the reason for the perceived non-compliance. However, even though this explanation may carry some weight, the fact that at least one of Finland's ministries refer to a 40% representation as the guideline debunks this hypothesis to some extent (Keski-Petäjä & Katainen 2017, p. 9).

6.3 Research design

The non-compliance among Finnish state-owned companies has strong implications for the analysis of my results. Companies who comply to a higher degree might potentially differ from companies who comply to a lesser degree in several aspects. It is possible that companies that have undertaken "pro-female actions" (such as e.g. improving parental leave conditions, or other measures which comparatively would benefit female employees) complied to a higher degree, which would mean that my results are local treatment effects for companies who comply, and over-estimated if they would be applied to the whole sample. The rationale in this hypothetical scenario is that companies that undertake other "pro-female actions" would be more likely to employ women as board members. The reverse correlation is also possible, i.e. companies who comply to a higher degree have already undertaken other "pro-female actions", and therefore have less room to improve. If that is the case, the results would be under-estimated.

The reasoning above may seem counter-intuitive to the reasoning provided in the limitations sub-chapter, where I explained that one possible threat to my model is that companies who are more "pro-female" would have more female directors in 2004 and thus less room to improve; therefore, understating the effect and violating the exogeneity restriction. The two are not mutually exclusive, however. It is possible that companies that were more "pro-female" in 2004 had a larger share of female board members and made faster progress in the outcomes measured, while also complying to the quota to a higher degree.

My methodology might violate the exclusion restriction, as discussed under the limitations sub-chapter. It is possible that companies are more prone to appoint their own female employees to their board, compared to the rest of the workforce. In that case, the exclusion restriction would be violated, and the estimates would be biased downward, given that the women would be among the top earners in the companies. Whether or not this happens could be analyzed by researching how likely a new board member is to have worked in the same company right before the appointment. I have elected not to do that research in this thesis, as it would have little to no implications for my conclusions, given the weak instruments which disregard any causal interpretations regardless.

6.4 Weak instruments

The low F-statistics combined with the weak first stage show that my instrumental variables approach is not the right research design to study the impact of the Finnish gender quota on female labor market outcomes. To be viable, the instruments would have to be stronger. Therefore, my results neither prove nor disprove the hypothesis that gender quotas would improve female labor market outcomes. My results can, however, be interpreted as evidence that Finnish state-owned companies did not comply with the law in each year between 2005-2017 on average.

Moreover, my results also show that state-owned companies with few women on the board in 2004 did not increase their share of women significantly more than their peers with more women on the board in 2004, which is the main factor to invalidate my research design. Even if compliance would not have been total, the approach could have yielded interesting results if companies with a low share of women pre-quota increased their share of women relatively and significantly more than companies with a high share of women pre-quota. For further research,

alternative instruments or an alternative approach needs to be used for a causal interpretation of a quota's effect on female labor market outcomes in Finnish state-owned companies.

The two paragraphs above may seem contradicting to figure 3, which shows a clear increase in female board membership among government-owned companies. However, even though figure 3 shows that companies did increase their average share of female board members during the timeframe, it means that the increase was not asymmetric in the way that would be essential for my research design. Instead, companies with a larger share of female board members pre-quota increased the share of female board members by approximately as much as companies with a low share of female board members pre-quota, which is also supported by figures 6 and 7. Moreover, figure 3 weighs every company equally, while the regressions are weighted on the number of employees in each company.

6.5 Further research and relevance

My thesis provides evidence for, that during 2005-2017 many Finnish state-owned companies did not comply with the board quota which came into law in 2004. Therefore, the board quota has been inefficient in reaching its main purpose: increasing the share of women on company boards.

My thesis focuses on whether the quota has improved female labor market outcomes but does not come to any conclusive evidence due to non-compliance by the state-owned companies. However, improving female labor market outcomes is not necessarily the main objective behind the quota. A quota might for example have symbolic value, which might be enough to justify its existence.

The OLS-regressions (listed in appendix table A2) show positive, albeit imprecise, correlations between the outcome variables and female board member share when company-fixed effects are removed, which I argue is almost a necessary condition for a quota to have positive effects on the measured outcomes. If there would be no such correlation, any positive effect could theoretically exist; however, it would mean that women are appointed to boards in companies where females perform comparatively worse, which although possible, I deem unlikely. Therefore, I argue that there is a possibility that a quota could have a positive impact on female labor market outcomes in Finnish state-owned companies, given that companies would comply to a high degree.

Since the research design in this thesis failed, an alternative approach to research the impact of the quota is needed. One viable alternative could be to perform a propensity score matching difference-in-differences study, pairing state-owned companies that increased their share of female board members significantly to other state-owned companies which are alike in observable characteristics, but for some reasons did not increase their share of female board members. Such an approach could possibly filter out some of the endogeneity behind the decision to increase the share of female board members and provide interesting data to the discussion.

7. Conclusions

I conclude that the Finnish gender quota for state-owned companies has not had any positive effects on the measured female labor market outcomes. During the timeframe, the quota has been ineffective not only in improving female labor market outcomes, but also in increasing the share of women on company boards. Even though the share of female board members in Finnish state-owned companies has increased during the studied timeframe, figures 3-6 show that the increase could just as well had happened without the quota, as the pre-trends were positive, and many companies still had zero women on their board nine years after the quota was implemented.

I also conclude that the results ultimately follow the pattern of previous literature in that the gender quota was proven ineffective in improving female labor market outcomes; however, in comparison to the previous literature, my conclusion does not stem from the idea that the gender quota is an inefficient tool. Instead, my results found out that Finnish state-owned companies failed to comply with the gender quota; hence, the quota had no effect. Furthermore, I proved that the quota did not improve female labor market outcomes through other channels than raising the share of female board members in my reduced form results. Companies with a low share of female board members in 2004 did not improve their female labor market outcomes relatively more than companies with a higher share of female board members in 2004.

Additionally, I conclude that there is a possibility that a gender quota benefits female labor market outcomes in Finland. This thesis can neither provide evidence toward, nor can it debunk the hypothesis that a quota would be beneficial. Therefore, a gender quota might be a relevant policy tool to improve female labor market outcomes in Finland, given that companies would comply.

Lastly, I conclude that there is a possibility that the gender quota has had other effects which are not captured by this study. It is in no way certain that improving female labor market outcomes was the only objective of the quota; therefore, I take no stance in the overall success of the quota besides noting that it has not reached its main objective: equal representation. For example, it is possible that the symbolic value of equal representation on paper, or any other positive effect the quota might have, is enough to justify the quota's existence.

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9. Appendix

TABLE A1

List of control variables

Time-varying control variables
Employee average age
Share of employees with upper secondary education
Share of employees with undergraduate education
Share of employees with postgraduate education
Share of employees with doctoral degrees
Share of employees that are married
Share of employees that have children
Share of employees with upper secondary education that are women
Share of employees with undergraduate education that are women
Share of employees with postgraduate education that are women
Share of employees with doctoral degrees that are women
Share of employees that are married that are women
Share of employees that have children that are women
General Controls
Company industry category

Table A2

Correlations between the share of women on company boards and the outcome variables

	Panel A: OLS regressions with company fixed effects									
Dependent Variable	*Female Employee share*		*Share of female employees with earning above the … in the earnings distribution*						*Number of women among top 5 earners*	
			75th percentile		*90th percentile*		*95th percentile*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Percent women on board in year t	0.118***	0.104***	-0.0194	-0.0427	-0.0491	-0.0798	-0.0251	-0.0359	0.737*	0.454
	(0.0322)	(0.0324)	(0.0555)	(0.0627)	(0.0395)	(0.0484)	(0.0435)	(0.0568)	(0.435)	(0.503)
Only government-owned companies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Time-varying company controls	No	No	No	No	No	No	No	No	No	No
Company fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4 933	889	4 933	889	4 933	889	4 933	889	4 933	889
R^2	0.943	0.704	0.923	0.949	0.850	0.890	0.735	0.769	0.711	0.704
	Panel B: OLS regressions without company fixed effects									
Dependent Variable	*Female Employee share*		*Share of female employees with earning above the … in the earnings distribution*						*Number of women among top 5 earners*	
			75th percentile		*90th percentile*		*95th percentile*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Percent women on board in year t	0.189***	0.250***	0.0563	0.0590	0.0553	0.0388	0.0720	0.0597	0.606**	0.506
	(0.0512)	(0.0713)	(0.0577)	(0.0834)	(0.0568)	(0.0841)	(0.0505)	(0.0721)	(0.297)	(0.393)
Only government-owned companies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Time-varying company controls	No	No	No	No	No	No	No	No	No	No
Company fixed effects	No	No	No	No	No	No	No	No	No	No
Observations	4,964	903	4,964	903	4,964	903	903	903	4,964	903
R^2	0.754	0.804	0.696	0.756	0.610	0.689	0.595	0.595	0.551	0.617

Notes: Estimates are based on a sample containing data from Finnish state-owned companies from 2004-2017. All regressions include year fixed effects and controls for company-specific industry categories. Time-varying company controls are listed in the appendix table A1. Observations in all columns are weighted on the number of workers in each company. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered on the company level

Table A3

Reduced Form Estimates

Dependent Variable	Reduced Form Estimates									
	Female Employee share		*Share of female employees with earning above the … in the earnings distribution*						*Number of women among top 5 earners*	
			75th percentile		*90th percentile*		*95th percentile*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bite	-0.0154	-0.0385	0.0443	0.0180	-0.0111	-0.0515	-0.0181	-0.0661	-0.0371	-0.357
	(0.0448)	(0.0500)	(0.0460)	(0.0552)	(0.0505)	(0.0565)	(0.0541)	(0.0576)	(0.444)	(0.485)
Time-varying company controls	No	No	No	No	No	No	No	No	No	No
Only government-owned companies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	5,385	1,009	5,385	1,009	5,385	1,009	5,385	1,009	5,385	1,009
R^2	0.935	0.950	0.916	0.948	0.846	0.892	0.737	0.779	0.666	0.704

Notes: Estimates are based on a sample containing data from Finnish state-owned companies from 2004-2017. All regressions include company fixed effects, year fixed effects, and controls for company-specific industry categories. Time-varying company controls are listed in the appendix table A1. Observations in all columns are weighted on the number of workers in each company.

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered on the company level

Table A4

Sample summary statistics per year – all state-owned companies

Year	Nr of companies	Mean employee count	Median board size	Mean board Size	Median women on board	Mean women on board	Mean % women on board	Median % women on board	Female Employee Share	Women in top 5 %	Women in top 10%	Women in top 25%	Women in Top 5
1994	158	214.6	5.5	5.17	0	0.11	0.022	0.000	0.339	0.155	0.206	0.292	1.013
1995	167	308.5	6	5.72	0	0.38	0.067	0.000	0.331	0.191	0.243	0.308	1.018
1996	164	312.5	6	5.96	1	0.79	0.133	0.167	0.343	0.265	0.346	0.438	1.122
1997	274	189.8	6	5.90	1	1.09	0.184	0.167	0.362	0.108	0.120	0.172	1.000
1998	298	192.9	6	5.88	1	1.30	0.221	0.167	0.364	0.110	0.126	0.174	0.970
1999	357	160.9	6	5.84	1	1.43	0.246	0.167	0.372	0.110	0.130	0.162	0.989
2000	410	186.2	6	5.78	1	1.46	0.252	0.167	0.359	0.102	0.119	0.179	0.937
2001	459	174.1	6	5.71	1	1.44	0.252	0.167	0.363	0.181	0.200	0.226	0.893
2002	501	157.2	6	5.72	1	1.41	0.247	0.167	0.365	0.184	0.196	0.228	0.982
2003	542	146.5	5	5.61	1	1.47	0.263	0.200	0.369	0.209	0.221	0.254	0.972
2004	638	134.4	5	5.52	1	1.43	0.258	0.200	0.378	0.226	0.236	0.258	1.000
2005	549	145.2	5	5.74	1	1.58	0.275	0.200	0.394	0.223	0.246	0.280	1.087
2006	511	151.0	5	5.77	2	1.62	0.281	0.400	0.390	0.150	0.167	0.210	1.070
2007	492	156.6	5	5.81	2	1.65	0.284	0.400	0.386	0.129	0.169	0.207	1.122
2008	476	159.9	5	5.78	2	1.69	0.292	0.400	0.394	0.151	0.167	0.214	1.155
2009	446	150.6	6	5.93	2	1.82	0.307	0.333	0.390	0.152	0.177	0.224	1.135
2010	436	152.4	6	5.88	2	1.83	0.312	0.333	0.387	0.144	0.173	0.214	1.165
2011	421	154.3	6	5.93	2	1.85	0.312	0.333	0.383	0.131	0.164	0.204	1.216
2012	403	157.7	6	5.92	2	1.86	0.314	0.333	0.380	0.144	0.182	0.217	1.154
2013	383	152.4	6	5.94	2	1.88	0.316	0.333	0.381	0.145	0.163	0.217	1.178
2014	369	140.8	6	5.90	2	1.89	0.320	0.333	0.377	0.153	0.172	0.212	1.089
2015	344	141.3	6	5.92	2	1.90	0.321	0.333	0.361	0.153	0.174	0.210	1.134
2016	356	131.3	6	5.97	2	1.93	0.324	0.333	0.370	0.169	0.192	0.230	1.197
2017	334	132.8	6	6.50	2	2.17	0.335	0.333	0.391	0.195	0.211	0.247	1.314

Notes: All numbers are unweighted means or medians. The sample is limited to companies that existed in 2004.

Table A5

Sample summary statistics per year – Municipality-owned companies

Year	Nr of companies	Mean employee count	Median board size	Mean board Size	Median women on board	Mean women on board	Mean % women on board	Median % women on board	Female Employee Share	Women in top 5 %	Women in top 10%	Women in top 25%	Women in Top 5
1994	110	30.8	7	6.63	0	0.25	0.038	0	0.341	0.166	0.211	0.290	1.182
1995	109	27.0	6	6.02	0	0.47	0.078	0	0.324	0.198	0.234	0.271	1.138
1996	108	30.5	6	6.12	1	0.95	0.155	0.167	0.330	0.242	0.306	0.395	1.120
1997	206	23.1	6	6.06	1	1.28	0.211	0.167	0.368	0.104	0.113	0.163	1.112
1998	225	23.1	6	6.02	2	1.61	0.268	0.333	0.370	0.103	0.119	0.172	1.084
1999	280	18.5	6	5.96	2	1.70	0.285	0.333	0.371	0.101	0.116	0.146	1.093
2000	330	16.9	6	5.88	2	1.67	0.284	0.333	0.359	0.100	0.116	0.175	1.024
2001	365	17.0	6	5.89	2	1.64	0.279	0.333	0.365	0.189	0.211	0.234	0.981
2002	382	17.7	6	5.99	2	1.64	0.274	0.333	0.363	0.194	0.202	0.234	1.086
2003	409	17.0	6	5.95	2	1.73	0.291	0.333	0.371	0.226	0.238	0.272	1.076
2004	480	16.7	6	5.89	2	1.66	0.282	0.333	0.387	0.246	0.254	0.279	1.083
2005	432	19.9	6	6.04	2	1.76	0.291	0.333	0.401	0.234	0.254	0.291	1.146
2006	411	20.9	6	6.04	2	1.76	0.291	0.333	0.396	0.146	0.165	0.207	1.124
2007	398	21.6	6	6.08	2	1.77	0.292	0.333	0.392	0.119	0.167	0.206	1.178
2008	387	22.1	6	6.04	2	1.81	0.299	0.333	0.395	0.144	0.160	0.207	1.199
2009	364	23.6	6	6.20	2	1.95	0.314	0.333	0.386	0.142	0.166	0.215	1.151
2010	360	23.7	6	6.10	2	1.92	0.316	0.333	0.381	0.132	0.163	0.206	1.175
2011	349	23.9	6	6.17	2	1.95	0.316	0.333	0.375	0.113	0.151	0.194	1.209
2012	334	23.0	6	6.19	2	1.94	0.314	0.333	0.374	0.132	0.175	0.207	1.153
2013	319	22.4	6	6.21	2	1.95	0.314	0.333	0.373	0.129	0.146	0.204	1.154
2014	308	22.0	6	6.14	2	1.94	0.315	0.333	0.372	0.137	0.155	0.199	1.078
2015	288	21.2	6	6.17	2	1.94	0.314	0.333	0.347	0.129	0.151	0.191	1.090
2016	302	18.8	6	6.18	2	1.97	0.319	0.333	0.360	0.149	0.176	0.216	1.152
2017	285	19.5	6	6.67	2	2.20	0.329	0.333	0.383	0.180	0.192	0.233	1.263

Notes: All numbers are unweighted means or medians. The sample is limited to companies that existed in 2004.

Table A6

Sample summary statistics per year – Government-owned companies

Year	Nr of companies	Mean employee count	Median board size	Mean board Size	Median women on board	Mean women on board	Mean % women on board	Median % women on board	Female Employee Share	Women in top 5 %	Women in top 10%	Women in top 25%	Women in Top 5
1994	46	663.2	3.5	4.00	0	0.00	0.000	0	0.348	0.652	0.202	0.309	0.652
1995	54	899.4	5	5.34	0	0.29	0.053	0	0.362	0.815	0.280	0.401	0.815
1996	54	887.8	6	5.76	0	0.54	0.094	0	0.374	1.130	0.421	0.525	1.130
1997	67	705.2	5	5.27	0	0.54	0.103	0	0.349	0.672	0.145	0.201	0.672
1998	73	716.1	5	5.46	0	0.36	0.066	0	0.344	0.616	0.146	0.179	0.616
1999	76	685.2	5	5.38	0	0.45	0.084	0	0.372	0.605	0.178	0.215	0.605
2000	79	893.5	5	5.35	0	0.59	0.110	0	0.358	0.570	0.128	0.191	0.570
2001	93	790.4	5	5.00	0	0.60	0.120	0	0.354	0.559	0.158	0.196	0.559
2002	118	608.1	5	4.84	0	0.67	0.138	0	0.369	0.644	0.175	0.208	0.644
2003	131	551.3	4	4.54	0	0.66	0.145	0	0.359	0.664	0.167	0.200	0.664
2004	156	496.5	4	4.34	0	0.66	0.153	0	0.349	0.756	0.180	0.194	0.756
2005	115	616.0	4	4.57	0.5	0.87	0.190	0.13	0.370	0.870	0.218	0.241	0.870
2006	99	690.6	4	4.62	1	1.04	0.226	0.25	0.364	0.848	0.180	0.223	0.848
2007	93	733.9	4	4.59	1	1.09	0.238	0.25	0.360	0.849	0.174	0.208	0.849
2008	88	765.2	4	4.56	1	1.14	0.249	0.25	0.387	0.966	0.196	0.237	0.966
2009	82	697.1	4	4.61	1	1.23	0.266	0.25	0.406	1.061	0.228	0.261	1.061
2010	76	753.5	5	4.76	1	1.38	0.290	0.20	0.419	1.118	0.225	0.251	1.118
2011	72	777.3	4	4.66	1	1.32	0.284	0.25	0.424	1.250	0.228	0.256	1.250
2012	68	815.3	4	4.55	1	1.43	0.314	0.25	0.412	1.162	0.224	0.267	1.162
2013	63	812.6	4	4.52	1	1.52	0.336	0.25	0.425	1.317	0.251	0.288	1.317
2014	60	752.6	4	4.51	1	1.61	0.358	0.25	0.403	1.150	0.258	0.275	1.150
2015	55	772.1	4	4.53	1	1.64	0.363	0.25	0.436	1.345	0.293	0.302	1.345
2016	53	774.8	5	4.69	1	1.71	0.364	0.20	0.426	1.434	0.290	0.308	1.434
2017	48	808.0	5	5.43	2	2.04	0.376	0.40	0.440	1.604	0.331	0.330	1.604

Notes: All numbers are unweighted means or medians. The sample is limited to companies that existed in 2004.

Table A7

Sample summary statistics per year – State-owned companies with 0 women on their board

Year	Nr of companies	Mean employee count	Median board size	Mean board Size	Median women on board	Mean women on board	Mean % women on board	Median % women on board	Female Employee Share	Women in top 5 %	Women in top 10%	Women in top 25%	Women in Top 5
1994	5	262.6	3	4.00	0	0	0	0	0.240	0.013	0.097	0.370	0.400
1995	22	827.0	5	5.32	0	0	0	0	0.280	0.047	0.106	0.212	0.773
1996	31	634.1	6	6.13	0	0	0	0	0.338	0.226	0.352	0.452	1.129
1997	46	360.6	5	5.37	0	0	0	0	0.312	0.089	0.088	0.142	0.804
1998	59	322.8	5	5.15	0	0	0	0	0.305	0.116	0.128	0.165	0.593
1999	66	291.5	5	5.00	0	0	0	0	0.301	0.094	0.119	0.149	0.636
2000	77	271.5	5	4.95	0	0	0	0	0.307	0.101	0.103	0.160	0.558
2001	94	227.5	5	4.74	0	0	0	0	0.305	0.137	0.144	0.168	0.500
2002	117	205.2	5	4.68	0	0	0	0	0.300	0.135	0.145	0.162	0.658
2003	132	183.1	5	4.61	0	0	0	0	0.303	0.144	0.159	0.175	0.598
2004	180	162.7	4	4.54	0	0	0	0	0.314	0.175	0.184	0.200	0.728
2005	115	165.7	5	4.63	0	0	0	0	0.326	0.189	0.206	0.234	0.817
2006	88	192.7	4	4.65	0	0	0	0	0.296	0.142	0.147	0.173	0.761
2007	75	107.7	5	4.75	0	0	0	0	0.278	0.071	0.110	0.132	0.693
2008	60	113.6	5	4.87	0	0	0	0	0.305	0.123	0.114	0.164	0.883
2009	47	147.0	5	4.81	0	0	0	0	0.317	0.110	0.159	0.189	0.957
2010	47	128.8	5	4.94	0	0	0	0	0.301	0.061	0.067	0.143	0.851
2011	43	135.9	5	4.88	0	0	0	0	0.293	0.108	0.098	0.160	0.953
2012	40	144.6	5	4.83	0	0	0	0	0.265	0.064	0.085	0.150	0.850
2013	35	135.2	5	4.86	0	0	0	0	0.287	0.112	0.100	0.161	0.857
2014	30	99.2	5	4.60	0	0	0	0	0.297	0.059	0.093	0.158	0.800
2015	27	62.7	5	4.85	0	0	0	0	0.320	0.205	0.194	0.254	0.963
2016	25	57.5	5	4.76	0	0	0	0	0.352	0.178	0.175	0.256	1.000
2017	23	61.2	5	4.87	0	0	0	0	0.366	0.230	0.261	0.233	1.087

Notes: All numbers are unweighted means or medians. The sample is limited to companies that existed in 2004.

Table A8

Effect of board gender quota on female outcomes in Finnish government-owned companies. Instrumental variables regressions

Dependent Variable	Government-owned Companies				
	Female Employee share	*Share of female employees with earning above the … in the earnings distribution*			*Number of women among top 5 earners*
		75th percentile	*90th percentile*	*95th percentile*	
	(1)	(3)	(5)	(7)	(9)
Percent women on board in year t	-0.00129	0.203	-0.189	-0.0369	-1.543
	(0.120)	(0.122)	(0.138)	(0.140)	(1.839)
Time-varying company controls	No	No	No	No	No
Instrument year	2004	2004	2004	2004	2004
Observations	889	889	889	889	889
R^2	0.084	0.009	0.044	0.009	-0.106

Notes: Estimates are based on a sample containing data from Finnish government-owned companies from 2004-2017. All regressions include company fixed effects, year fixed effects, and controls for company-specific industry categories. Observations in all columns are weighted on the number of workers in each company. The appendix table A1 reports the first-stage regressions. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered on the company level